HHS Public Access

Author manuscript

*J Psychiatr Res*. Author manuscript; available in PMC 2024 May 30.

Published in final edited form as:

*J Psychiatr Res*. 2023 May ; 161: 412–418. doi:10.1016/j.jpsychires.2023.03.034.

# Prevalence and gender distribution of excoriation (skin-picking) disorder: a systematic review and meta-analysis

**Luis C. Farhat, MD**[a,b,*], **Madison Reid**[*,a], **Michael Bloch, MD MS**[a,c], **Emily Olfson, MD PhD**[a]

[a] -Yale Child Study Center, Yale University, New Haven, CT, US.

[b] -Department of Psychiatry, Faculdade de Medicina FMUSP, Universidade de São Paulo, São Paulo, BR.

[c] -Department of Psychiatry, Yale University School of Medicine, New Haven, CT, US.

## Abstract

Epidemiological studies of excoriation disorder have reported different prevalence estimates for this condition, limiting our understanding of its public health impact. We performed a systematic review and meta-analysis to collate epidemiological studies of excoriation disorder. We aimed to estimate the pooled prevalence and the female-to-male ratio of excoriation disorder in the general population. We searched Embase, PsycInfo, and PubMed up to May 2020 and updated the PubMed search in October 2021. Studies which reported the frequency of excoriation disorder in a sample from the general population were included in our meta-analyses. We made no restrictions regarding the definition or assessment of excoriation disorder. Data were pooled through random-effects meta-analyses. Of the 677 records identified through database searches, 19 studies involving 38,038 participants met our inclusion criteria. Meta-analyses demonstrated that excoriation disorder has an overall prevalence of 3.45% (95% CI 2.55, 4.65%) and impacts women more than men (female-to-male OR = 1.45; 95% CI 1.15, 1.81, p = 0.001). These findings underscore the public health impact of excoriation disorder, which will hopefully motivate future research focused on advancing our understanding and management of this condition.

### Keywords

epidemiology; prevalence; excoriation disorder; skin picking disorder; meta-analysis

**Corresponding author:** Dr. Emily Olfson, MD, PhD, at the Yale Child Study Center, 230 South Frontage Road, New Haven, CT, 06519, US. emily.olfson@yale.edu.

*These authors contributed equally to this work

Conflict of interest

M. H. B. has received grant or research support from Therapix Biosciences, Emalex Biosciences, Neurocrine Biosciences, Janssen Pharmaceuticals, Biohaven Pharmaceuticals, NIH, National Alliance for Research on Schizophrenia and Depression (NARSAD), Lesbian Health Fund, Yale Foundation for Lesbian and Gay Studies (FLAGS), and Patterson Foundation. He has served on the advisory board/data monitoring and safety board of Therapix Biosciences. He serves as associate editor of Journal of Child Psychology and Psychiatry and on the editorial boards of Journal of Child and Adolescent Psychopharmacology and Depression & Anxiety. He has received royalties from Wolters Kluwer for Lewis's Child and Adolescent Psychiatry: A Comprehensive Textbook, Fifth Edition. He has received moonlighting pay from the Veteran's Administration.

## Introduction

Excoriation disorder (ED, or skin-picking disorder) is a psychiatric disorder characterized by repetitive skin-picking leading to tissue damage and impairment or distress despite attempts to decrease or stop skin-picking behaviors (American Psychiatric Association, 2013). Research suggests that ED typically onsets in adolescence (Ricketts et al., 2018) and has a female preponderance (Grant et al., 2012). Although varying gender (female-to-male) ratios from 0.57 to 3 have been reported in the literature (Odlaug et al., 2013; Taman, 2017), data from a recent large study suggested a female-to-male ratio of 1.2 (Grant and Chamberlain, 2020). Individuals with ED often spend hours per day picking at their skin, which may cause shame and embarrassment and may lead to physical (noticeable scars, scabs) and psychosocial (missed work, school, and other obligations) impairment (Flessner and Woods, 2006; Tucker et al., 2011). Additionally, ED often co-occurs with other psychiatric disorders, including depression, anxiety, obsessive-compulsive disorder (OCD), and substance use disorders, which may contribute to higher skin-picking symptom severity (Grant and Chamberlain, 2017; Leppink et al., 2016).

ED is currently classified in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (American Psychiatric Association, 2013) as an Obsessive-Compulsive and Related Disorder (OCRD) due to shared phenomenological and neurobiological (brain structure and genetic correlation) characteristics with OCD and other OCRDs, including trichotillomania (TTM) (Grant et al., 2016; Harries et al., 2017; Lochner et al., 2005; Monzani et al., 2014; Stein et al., 2010; Swedo et al., 1992). However, unlike OCD that has several first-line, well-established psychotherapeutic and psychopharmacological treatments (Hirschtritt et al., 2017; Skapinakis et al., 2016), there are fewer treatment options available for ED. Psychotherapeutic interventions such as cognitive-behavioral approaches with habit reversal training show some efficacy in reducing ED symptoms in randomized controlled trials (Schumer et al., 2016; Selles et al., 2016), but these results have been mostly observed in the short-term and relapse may occur in the long-term, which has been shown for other body-focused repetitive behaviors (BFRBs) such as TTM (Keijsers et al., 2006; Swedo et al., 1993). Different medications have been examined for the treatment of ED (Schumer et al., 2016; Selles et al., 2016), but to date there are no well-established pharmacological interventions for this condition.

The current lack of efficacious treatments for ED may be partially explained by the fact that ED is under-researched compared to other psychiatric conditions such as depression, schizophrenia, and OCD. Regulatory and funding agencies such as the Food and Drug Administration (FDA), the National Institute of Health (NIH), and pharmaceutical companies are often incentivized to allocate resources for conditions that are associated with considerable burden in the general population. Therefore, well-defined prevalence estimates for ED could contribute to the development of more treatment studies focused on ED.

Large-scale epidemiological studies in nationally representative samples have not evaluated ED, with a few notable exceptions (Keuthen et al., 2010), and therefore most of the available evidence on the prevalence of ED is primarily based on small studies (Bohne et al., 2002; Calikusu et al., 2012; Hayes et al., 2009; Keuthen et al., 2000; Leibovici et al., 2015;

Sulkowski et al., 2011; Taman, 2017; Teng et al., 2002), which adopted different sampling and diagnostic procedures. For instance, some studies sampled individuals from schools/universities (Houghton et al., 2018; Keuthen et al., 2000), while others recruited participants online (Grant and Chamberlain, 2020; Machado et al., 2018) or public spaces (Hayes et al., 2009). Likewise, some studies adopted DSM-5 criteria to determine ED (Odlaug et al., 2013; Prochwicz et al., 2016) while others adopted general definitions of ED based on recurrent skin-picking with distress or impairment (Houghton et al., 2018; Keuthen et al., 2000) or self-reported diagnoses (Grant and Chamberlain, 2020). As a result, varying prevalence estimates from 1.4% to 5.4% (Hayes et al., 2009; Keuthen et al., 2010) have been reported. More recently, Grant and Chamberlain (2020) found that 2.1% of 10,169 adults reported a current diagnosis of ED through an online survey.

Given the significant methodological heterogeneity and the inconsistent prevalence findings reported across studies, we conducted a systematic review of epidemiological studies of ED to determine their characteristics as well as their sampling and diagnostic procedures. In that way, this systematic review provides an opportunity to evaluate study-level characteristics that may drive differences in reported prevalence estimates across studies. We also combined the available data into a pooled prevalence estimate and gender ratio of ED in an attempt to provide a best estimate measure of the distribution of ED in the general population considering all the available evidence.

## Materials and methods

This study is reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Page et al., 2021). A protocol was not pre-registered. All review stages were conducted by two independent reviewers (EO, LCF, or MR) and disagreements were solved with a third independent reviewer (EO or MHB).

### Eligibility criteria and study identification

Records were considered eligible for inclusion in the meta-analysis if they provided data on the prevalence of ED in a sample from the general population. Because there have been no formal diagnostic criteria for ED until the latest edition of the DSM, we made no restrictions regarding the definition of ED nor the instrument adopted to operationalize ED. However, we excluded studies that assessed skin-picking as a self-injurious behavior (i.e., that queried about skin-picking in the context of other self-injurious behaviors, such as cutting, burning, or self-inserting objects under nails, etc.).

We searched select electronic databases (Embase, PsycInfo, PubMed) up to May 2020 and repeated the PubMed search in October 2021. The search strategies employed were tailored to each database and are described in detail in the supplementary file. We also inspected the reference list of other reviews on the topic to identify additional eligible studies (Arnold et al., 2001; Grant and Chamberlain, 2021; Grant and Odlaug, 2009; Grant et al., 2012; Torales et al., 2020; Turk et al., 2022). We did not adopt language restrictions.

### Study selection and data extraction

Titles/abstracts were initially screened and subsequently the full text of potentially eligible articles was retrieved to assess eligibility. We extracted and coded from the included studies the following pieces of information: recruiting area, year of publication; participants' age, gender, and race/ethnicity; period investigated (lifetime versus current) and diagnostic criteria adopted. For the outcome data, we extracted the number of individuals with ED and the number of individuals in the entire sample. We also extracted the outcome data stratified by gender.

### Statistical analysis

The proportion of individuals with ED in relation to the entire sample size was the effect size index of choice. We also calculated an odds ratio (OR) describing the odds of being female with ED compared to the odds of being female in the non-ED group. This OR represents the female-to-male ratio among those with ED controlled for the female-to-male ratio among those without ED.

Proportions were pooled through random-effects meta-analysis in the framework of generalized linear mixed models (Schwarzer et al., 2019) and ORs were pooled through a standard pairwise random-effects meta-analysis weighted by the inverse of the variance. Heterogeneity between studies was evaluated with the Q-test and the $I^2$ statistic. For proportions, we ran subgroup analyses considering differences in gender (i.e., male vs. female), the criteria adopted to determine ED (i.e., DSM-5, DSM-IV adapted from trichotillomania, rating scale score threshold, self-reported diagnosis, and general skin-picking with skin lesions and impairment/distress), the setting of the sample (i.e., school/university, online survey, public spaces, household survey or twin study), the geographical region of the study, and the period investigated for the outcome (i.e., current versus lifetime). For OR, we conducted subgroup analysis considering the differences in the criteria adopted to determine ED. Publication bias was evaluated through the visual inspection of funnel plots and the Egger's regression test.

## Results

### Included studies and characteristics

Figure 1 illustrates the study selection procedures for our systematic review. Of the 677 records identified, only 26 records reporting on 17 studies were considered eligible for inclusion in our meta-analyses (Bohne et al., 2002; Calikusu et al., 2012; Grant and Chamberlain, 2020; Hayes et al., 2009; Houghton et al., 2018; Keuthen et al., 2000; Keuthen et al., 2010; Leibovici et al., 2015; Leibovici et al., 2014; Machado et al., 2018; Monzani, B. et al., 2012; Odlaug et al., 2013; Prochwicz et al., 2016; Solley and Turner, 2018; Sulkowski et al., 2011; Taman, 2017; Teng et al., 2002). Additionally, we identified 2 studies (Martínez-Aguayo et al., 2017; Selles et al., 2015) after inspection of the reference list of other reviews on the topic that had not been identified in our searches, likely because of the epidemiological terms that they used ('incidence', 'frequency'). The full lists of included and excluded studies are described in the supplementary file.

Table 1 describes the characteristics of the included studies. Of the nineteen included studies, eight (42.11%) were conducted in North America, four (21.05%) in the Middle East, three (15.79%) in Europe, two (10.53%) in South America, one (5.26%) in Oceania, and one (5.26%) in Central America. In total, 38,038 individuals with a mean age of 33 years were included in the analyses; 24,299 individuals (63.88%) were female. Of the eight studies conducted in the US, race/ethnicity was available for four of them and 11,145 individuals (73%) self-identified as white. Considering the setting of the sample, twelve (63.16%) of the studies were conducted in schools/universities, three (15.79%) in public spaces, one (5.26%) in a household survey, and one (5.26%) in a twin study; two (10.52%) were online surveys. Considering the criteria adopted to determine ED, eight (42.10%) adopted general skin-picking with skin lesions and impairment/distress; four (21.05%) relied on rating scale thresholds, most notably the Skin Picking Scale (SPS) (e.g., SPS ≥ 7; SPS ≥ 9); four (21.05%) adopted DSM-5 criteria (i.e., recurrent skin-picking leading to noticeable skin lesions and distress/impairment despite repeated attempts to decrease/stop skin-picking which is not attributable to other medical/psychiatric conditions); two (10.53%) adapted trichotillomania DSM-IV criteria to skin-picking (i.e., recurrent skin-picking leading to noticeable skin lesions and distress/impairment which is accompanied of tension/urge before picking that is relieved after skin-picking and is not attributable to other medical/psychiatric conditions); one (5.26%) adopted self-reported diagnoses.

## Prevalence

Meta-analysis of proportions identified a pooled prevalence estimate of ED of 3.45% (95% CI 2.55%, 4.65%) (Figure 2). There was significant evidence of heterogeneity between studies ($Q = 404.31$, $p < 0.0001$; $I^2 = 95.5\%$). Visual inspection of the funnel plot did not indicate asymmetry (Figure S1) and the Egger regression test was not significant ($t = -0.49$, $p = 0.63$).

Subgroup analysis stratified by the criteria adopted to determine ED identified significant differences ($Q = 29.67$, $p < 0.0001$); studies based on rating scale scores (4.50%; 95% CI 2.07%, 9.52%) had the highest prevalence while the one study based on self-reported diagnosis had the lowest prevalence (2.09%; 95% CI 1.83%, 2.39%) (Figure S2). Subgroup analysis stratified by setting of the sample identified significant differences ($Q = 108.46$, $p < 0.0001$) as studies based on public spaces had the highest prevalence (5.72%; 95% CI 4.92%, 6.64%) while one study based on a twin sample had the lowest prevalence (1.25%; 95% CI 0.85%, 1.77%) (Figure S3). Lastly, subgroup analysis stratified by continent identified significant differences ($Q = 56.03$, $p < 0.0001$) as the study in Oceania had the highest prevalence (9.91%; 95% CI 8.38%, 11.61%) while the studies in South America had the lowest prevalence (2.00%; 95% CI 0.78%, 5.06%) (Figure S4). Subgroup analysis did not identify significant differences considering the period investigated (current versus lifetime) for the outcome ($Q = 1.24$, $p = 0.27$) (Figure S5) or gender (females versus males) ($Q = 1.62$, $p = 0.20$) (Figure S6).

## Female-to-male ratio

Meta-analysis demonstrated a significant female preponderance of ED with an estimated female-to-male ratio of 1.45 (95% CI 1.15, 1.81, $p = 0.001$) (Figure 3). There was some

evidence of heterogeneity, although not statistically significant (Q = 19.71, p = 0.07; $I^2$ = 39%). Visual inspection of the funnel plot indicated some asymmetry (Figure S7), but the Egger regression test was non-significant (t = −0.08, p = 0.94). Subgroup analysis did not find significant differences in the female-to-male ratio according to the criteria adopted to determine ED (Q = 1.08; p = 0.89) (Figure S8).

## Discussion

We conducted a systematic review and meta-analyses to estimate the prevalence and gender distribution of ED in the general population. We included 19 studies involving 38,038 individuals with a mean age of 33 years. Meta-analyses demonstrated an estimated pooled ED prevalence of 3.45% (95% CI 2.55%, 4.65%) and a female preponderance of this condition, with a female-to-male ratio of ~1.5 (95% CI 1.15, 1.81).

Our finding that ~3.5% of the general population is impacted by ED demonstrates that, based on currently available data, this condition has a slightly higher prevalence than other obsessive-compulsive and related disorders, including OCD (Fawcett et al., 2020; Kessler et al., 2005), body dysmorphic disorder (Koran et al., 2008; Otto et al., 2001) and TTM (Thomson et al., 2022). ED has been associated with mild to moderate impairment in social, occupational, academic, and psychological functioning as well as decreased quality of life (Flessner and Woods, 2006; Odlaug et al., 2010; Tucker et al., 2011). Furthermore, ED remains a difficult-to-treat condition with limited efficacious therapeutic options (Schumer et al., 2016; Selles et al., 2016). As research marches forward, we hope that our current study showing that ED is relatively prevalent in the population will help increase the interest of the FDA, NIH, pharmaceutical companies, and other funding/regulatory bodies in prioritizing treatment studies focused on this condition.

Our finding that ED disproportionately impacts females agrees with the majority of available evidence regarding the gender distribution of BFRBs in general. For instance, epidemiological studies that evaluated BFRBs across diagnostic categories reported that these conditions are more common in females (Houghton et al., 2018; Solley and Turner, 2018). However, when considering specific diagnoses individually, although most of the epidemiological studies of TTM suggest that females are more likely to be affected than males (Thomson et al., 2022), a recent large-scale, nationally representative study based on an online sample did not identify gender-related differences in the prevalence of TTM (Grant et al., 2020). In this study, we found a pooled female-to-male ratio for ED that was similar in magnitude to the one found in our recent meta-analysis of TTM (1.5 versus 1.3) (Thomson et al., 2022). There are several possible explanations for why BFRBs may be more common in females, including sociocultural norms and increased susceptibility to other conditions strongly associated with BFRBs, e.g., depression and anxiety. However, it is also important to recognize that this female preponderance is not observed in other related conditions such as Tourette's Syndrome (Scharf et al., 2015). Larger studies focused on the gender distributions of BFRBs in general are warranted to clarify whether these conditions are indeed more common in females or if ED and TTM follow different gender distributions in the general population.

This study has several limitations that should be considered. Although we attempted to identify all available studies, we cannot discard the possibility of missing information. We also conducted several subgroup analyses to identify study-level characteristics that could be associated with the differential distribution of ED in the general population, and to stratify estimates by geographical region and gender in accordance with typical procedures from systematic reviews and meta-analyses of epidemiological studies (e.g., the Global Burden of Diseases) (GBD 2019 Mental Disorders Collaborators, 2022). However, caution is warranted to avoid overinterpretation of these subgroup findings. Given methodological variability across studies due to sampling and diagnostic procedures, we cannot confidently determine that differences between subgroups are only attributable to the variable used to create the subgroups. Indeed, the various procedures adopted across studies contributed to substantial heterogeneity, which was only partially accounted for in each subgroup analysis. Therefore, findings from subgroup analyses may represent confounded associations due to other differences between studies.

Additionally, we recognize that our findings are limited by shortcomings of the included epidemiological studies of ED. Specifically, most of the epidemiological studies of ED were based on non-probabilistic samples, which may limit the generalizability of our pooled estimates. Only three studies involved probabilistic samples (Keuthen et al., 2010; Monzani, Benedetta et al., 2012; Odlaug et al., 2013), but their findings may also be limited because of their reliance on specific sub-populations (twins and university students) and/or poor response rates, which may introduce selection bias. There is one study that used data from a nationally representative sample of the United States (Grant and Chamberlain, 2020), but it was based on an online survey in which individuals self-reported the presence/absence of a previous diagnosis of ED. Furthermore, most of the studies assessed the presence of ED through self-reported answers to checklists of symptoms and associated distress and impairment, or through a threshold based on an ED rating scale, without clinical evaluation. As the field moves forward, greater advancements in the knowledge of the prevalence of ED may be achieved through the adoption of probabilistic, representative samples of the general population; the inclusion of a sizable number of participants with equal coverage of both males and females; and the usage of valid and reliable methods to determine caseness. We hope that further developments in the field regarding the measurement of ED will also advance the epidemiological studies of this condition. In particular, the Minnesota Impulsive Disorders Interview (MIDI) is a structured clinical interview which was recently revised to incorporate other conditions including ED and might be used in future research to reliably measure the prevalence of this condition (Chamberlain and Grant, 2018).

Despite these limitations, this meta-analysis provides important new insights into the prevalence and gender distribution of ED, which we hope will contribute to inform discussions with patients and motivate future research. This meta-analysis also highlights the limitations of previous epidemiological studies of ED, and particularly underscores the need for additional prevalence studies which adopt ideal sampling and diagnostic procedures.

## Conclusion

Our study demonstrates that ~3.5% of the population is impacted by ED and that the condition has a female preponderance. These results can be leveraged to increase awareness about the public health importance of this condition.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgements:

L.C.F. was supported by São Paulo Research Foundation (FAPESP) (grant number #2021/08540-0). E.O. was supported by the National Institutes of Health (grant numbers R25MH077823, T32MH018268, K08MH128665). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

## References

American Psychiatric Association, 2013. Obsessive-Compulsive and Related Disorders, Diagnostic and Statistical Manual of Mental Disorders.

Arnold LM, Auchenbach MB, McElroy SL, 2001. Psychogenic Excoriation. CNS Drugs 15(5), 351–359. [PubMed: 11475941]

Bohne A, Wilhelm S, Keuthen NJ, Baer L, Jenike MA, 2002. Skin picking in German students: Prevalence, phenomenology, and associated characteristics. Behavior Modification 26(3), 320–339. [PubMed: 12080904]

Calikusu C, Kucukgoncu S, Tecer Ö, Bestepe E, 2012. Skin picking in Turkish students: prevalence, characteristics, and gender differences. Behav Modif 36(1), 49–66. [PubMed: 21937566]

Chamberlain SR, Grant JE, 2018. Minnesota Impulse Disorders Interview (MIDI): Validation of a structured diagnostic clinical interview for impulse control disorders in an enriched community sample. Psychiatry Res 265, 279–283. [PubMed: 29772488]

Fawcett EJ, Power H, Fawcett JM, 2020. Women Are at Greater Risk of OCD Than Men: A Meta-Analytic Review of OCD Prevalence Worldwide. J Clin Psychiatry 81(4).

Flessner CA, Woods DW, 2006. Phenomenological characteristics, social problems, and the economic impact associated with chronic skin picking. Behav Modif 30(6), 944–963. [PubMed: 17050772]

GBD 2019 Mental Disorders Collaborators, 2022. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Psychiatry 9(2), 137–150. [PubMed: 35026139]

Grant JE, Chamberlain SR, 2017. Clinical correlates of symptom severity in skin picking disorder. Compr Psychiatry 78, 25–30. [PubMed: 28779593]

Grant JE, Chamberlain SR, 2020. Prevalence of skin picking (excoriation) disorder. J Psychiatr Res 130, 57–60. [PubMed: 32781374]

Grant JE, Chamberlain SR, 2021. Trichotillomania and Skin-Picking Disorder: An Update. Focus (Am Psychiatr Publ) 19(4), 405–412. [PubMed: 35747295]

Grant JE, Dougherty DD, Chamberlain SR, 2020. Prevalence, gender correlates, and co-morbidity of trichotillomania. Psychiatry Res 288, 112948. [PubMed: 32334275]

Grant JE, Leppink EW, Tsai J, Chamberlain SR, Redden SA, Curley EE, Odlaug BL, Keuthen NJ, 2016. Does comorbidity matter in body-focused repetitive behavior disorders? Ann Clin Psychiatry 28(3), 175–181. [PubMed: 27490833]

Grant JE, Odlaug BL, 2009. Update on pathological skin picking. Current Psychiatry Reports 11(4), 283–288. [PubMed: 19635236]

Grant JE, Odlaug BL, Chamberlain SR, Keuthen NJ, Lochner C, Stein DJ, 2012. Skin picking disorder. Am J Psychiatry 169(11), 1143–1149. [PubMed: 23128921]

Harries MD, Chamberlain SR, Redden SA, Odlaug BL, Blum AW, Grant JE, 2017. A structural MRI study of excoriation (skin-picking) disorder and its relationship to clinical severity. Psychiatry Res Neuroimaging 269, 26–30. [PubMed: 28918268]

Hayes SL, Storch EA, Berlanga L, 2009. Skin picking behaviors: An examination of the prevalence and severity in a community sample. J Anxiety Disord 23(3), 314–319. [PubMed: 19223150]

Hirschtritt ME, Bloch MH, Mathews CA, 2017. Obsessive-Compulsive Disorder: Advances in Diagnosis and Treatment. Jama 317(13), 1358–1367. [PubMed: 28384832]

Houghton DC, Alexander JR, Bauer CC, Woods DW, 2018. Body-focused repetitive behaviors: More prevalent than once thought? Psychiatry Research 270, 389–393. [PubMed: 30300869]

Keijsers GP, van Minnen A, Hoogduin CA, Klaassen BN, Hendriks MJ, Tanis-Jacobs J, 2006. Behavioural treatment of trichotillomania: two-year follow-up results. Behav Res Ther 44(3), 359–370. [PubMed: 15927144]

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE, 2005. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry 62(6), 593–602. [PubMed: 15939837]

Keuthen NJ, Deckersbach T, Wilhelm S, Hale E, Fraim C, Baer L, O'Sullivan RL, Jenike MA, 2000. Repetitive skin-picking in a student population and comparison with a sample of self-injurious skin-pickers. Psychosomatics 41(3), 210–215. [PubMed: 10849452]

Keuthen NJ, Koran LM, Aboujaoude E, Large MD, Serpe RT, 2010. The prevalence of pathologic skin picking in US adults. Compr Psychiatry 51(2), 183–186. [PubMed: 20152300]

Koran LM, Abujaoude E, Large MD, Serpe RT, 2008. The prevalence of body dysmorphic disorder in the United States adult population. CNS Spectr 13(4), 316–322. [PubMed: 18408651]

Leibovici V, Koran LM, Murad S, Siam I, Odlaug BL, Mandelkorn U, Feldman-Weisz V, Keuthen NJ, 2015. Excoriation (skin-picking) disorder in adults: a cross-cultural survey of Israeli Jewish and Arab samples. Compr Psychiatry 58, 102–107. [PubMed: 25682319]

Leibovici V, Murad S, Cooper-Kazaz R, Tetro T, Keuthen NJ, Hadayer N, Czarnowicki T, Odlaug BL, 2014. Excoriation (skin picking) disorder in Israeli University students: prevalence and associated mental health correlates. Gen Hosp Psychiatry 36(6), 686–689. [PubMed: 25150776]

Leppink EW, Lust K, Grant JE, 2016. Depression in university students: associations with impulse control disorders. Int J Psychiatry Clin Pract 20(3), 146–150. [PubMed: 27314569]

Lochner C, Seedat S, du Toit PL, Nel DG, Niehaus DJ, Sandler R, Stein DJ, 2005. Obsessive-compulsive disorder and trichotillomania: a phenomenological comparison. BMC Psychiatry 5, 2. [PubMed: 15649315]

Machado MO, Köhler CA, Stubbs B, Nunes-Neto PR, Koyanagi A, Quevedo J, Soares JC, Hyphantis TN, Marazziti D, Maes M, Stein DJ, Carvalho AF, 2018. Skin picking disorder: Prevalence, correlates, and associations with quality of life in a large sample. CNS Spectrums 23(5), 311–320. [PubMed: 29730999]

Martínez-Aguayo JC, Middleton F, Nahuelcura K, Arancibia M, Meza N, Sepúlveda E, Gepp A, Escobar R, Madrid Aris E, 2017. Phenomenological characterization of body-focused repetitive impulsive behaviours and excoriation disorder in college students. Revista Chilena de Neuro-Psiquiatria 55, 221–230.

Monzani B, Rijsdijk F, Cherkas L, Harris J, Keuthen N, Mataix-Cols D, 2012. Prevalence and heritability of skin picking in an adult community sample: A twin study. American Journal of Medical Genetics Part B: Neuropsychiatric Genetics 159B(5), 605–610.

Monzani B, Rijsdijk F, Harris J, Mataix-Cols D, 2014. The Structure of Genetic and Environmental Risk Factors for Dimensional Representations of DSM-5 Obsessive-Compulsive Spectrum Disorders. JAMA Psychiatry 71(2), 182–189. [PubMed: 24369376]

Odlaug BL, Kim SW, Grant JE, 2010. Quality of life and clinical severity in pathological skin picking and trichotillomania. J Anxiety Disord 24(8), 823–829. [PubMed: 20594805]

Odlaug BL, Lust K, Schreiber LR, Christenson G, Derbyshire K, Grant JE, 2013. Skin picking disorder in university students: health correlates and gender differences. Gen Hosp Psychiatry 35(2), 168–173. [PubMed: 23123103]

Otto MW, Wilhelm S, Cohen LS, Harlow BL, 2001. Prevalence of body dysmorphic disorder in a community sample of women. Am J Psychiatry 158(12), 2061–2063. [PubMed: 11729026]

Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R, Glanville J, Grimshaw JM, Hróbjartsson A, Lalu MM, Li T, Loder EW, Mayo-Wilson E, McDonald S, McGuinness LA, Stewart LA, Thomas J, Tricco AC, Welch VA, Whiting P, McKenzie JE, 2021. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. Bmj 372, n160. [PubMed: 33781993]

Prochwicz K, Kałużna-Wielobób A, Kłosowska J, 2016. Skin picking in a non-clinical sample of young Polish adults. Prevalence and characteristics. Comprehensive Psychiatry 71, 77–85. [PubMed: 27639125]

Ricketts EJ, Snorrason Í, Kircanski K, Alexander JR, Thamrin H, Flessner CA, Franklin ME, Piacentini J, Woods DW, 2018. A latent profile analysis of age of onset in pathological skin picking. Compr Psychiatry 87, 46–52. [PubMed: 30199665]

Scharf JM, Miller LL, Gauvin CA, Alabiso J, Mathews CA, Ben-Shlomo Y, 2015. Population prevalence of Tourette syndrome: a systematic review and meta-analysis. Mov Disord 30(2), 221–228. [PubMed: 25487709]

Schumer MC, Bartley CA, Bloch MH, 2016. Systematic Review of Pharmacological and Behavioral Treatments for Skin Picking Disorder. J Clin Psychopharmacol 36(2), 147–152. [PubMed: 26872117]

Selles RR, McGuire JF, Small BJ, Storch EA, 2016. A systematic review and meta-analysis of psychiatric treatments for excoriation (skin-picking) disorder. Gen Hosp Psychiatry 41, 29–37. [PubMed: 27143352]

Selles RR, Nelson R, Zepeda R, Dane BF, Wu MS, Carlos Novoa J, Guttfreund D, Storch EA, 2015. Body focused repetitive behaviors among Salvadorian youth: Incidence and clinical correlates. Journal of Obsessive-Compulsive and Related Disorders 5, 49–54.

Skapinakis P, Caldwell DM, Hollingworth W, Bryden P, Fineberg NA, Salkovskis P, Welton NJ, Baxter H, Kessler D, Churchill R, Lewis G, 2016. Pharmacological and psychotherapeutic interventions for management of obsessive-compulsive disorder in adults: a systematic review and network meta-analysis. Lancet Psychiatry 3(8), 730–739. [PubMed: 27318812]

Solley K, Turner C, 2018. Prevalence and correlates of clinically significant body-focused repetitive behaviors in a non-clinical sample. Compr Psychiatry 86, 9–18. [PubMed: 30041079]

Stein DJ, Grant JE, Franklin ME, Keuthen N, Lochner C, Singer HS, Woods DW, 2010. Trichotillomania (hair pulling disorder), skin picking disorder, and stereotypic movement disorder: toward DSM-V. Depress Anxiety 27(6), 611–626. [PubMed: 20533371]

Sulkowski ML, Mariaskin A, Storch EA, 2011. Obsessive-compulsive spectrum disorder symptoms in college students. J Am Coll Health 59(5), 342–348. [PubMed: 21500051]

Swedo SE, Lenane MC, Leonard HL, 1993. Long-term treatment of trichotillomania (hair pulling). N Engl J Med 329(2), 141–142. [PubMed: 8510704]

Swedo SE, Leonard HL, Rapoport JL, 1992. Childhood-onset obsessive compulsive disorder. Psychiatric Clinics of North America 15(4), 767–775. [PubMed: 1461794]

Taman L., 2017. Prevalence and characteristics of impulse control disorders in a group of medical students. Alpha Psychiatry 18, 113–120.

Teng EJ, Woods DW, Twohig MP, Marcks BA, 2002. Body-focused repetitive behavior problems: Prevalence in a nonreferred population and differences in perceived somatic activity. Behavior Modification 26, 340–360. [PubMed: 12080905]

Thomson HA, Farhat LC, Olfson E, Levine JLS, Bloch MH, 2022. Prevalence and gender distribution of trichotillomania: A systematic review and meta-analysis. J Psychiatr Res 153, 73–81. [PubMed: 35802953]

Torales J, Díaz NR, Barrios I, Navarro R, García O, O'Higgins M, Castaldelli-Maia JM, Ventriglio A, Jafferany M, 2020. Psychodermatology of skin picking (excoriation disorder): A comprehensive review. Dermatol Ther 33(4), e13661. [PubMed: 32447793]

Tucker BT, Woods DW, Flessner CA, Franklin SA, Franklin ME, 2011. The Skin Picking Impact Project: phenomenology, interference, and treatment utilization of pathological skin picking in a population-based sample. J Anxiety Disord 25(1), 88–95. [PubMed: 20810239]

Turk T, Liu C, Straube S, Dytoc M, Hagtvedt R, Dennett L, Abba-Aji A, Fujiwara E, 2022. The global prevalence of primary psychodermatologic disorders: a systematic review. J Eur Acad Dermatol Venereol.

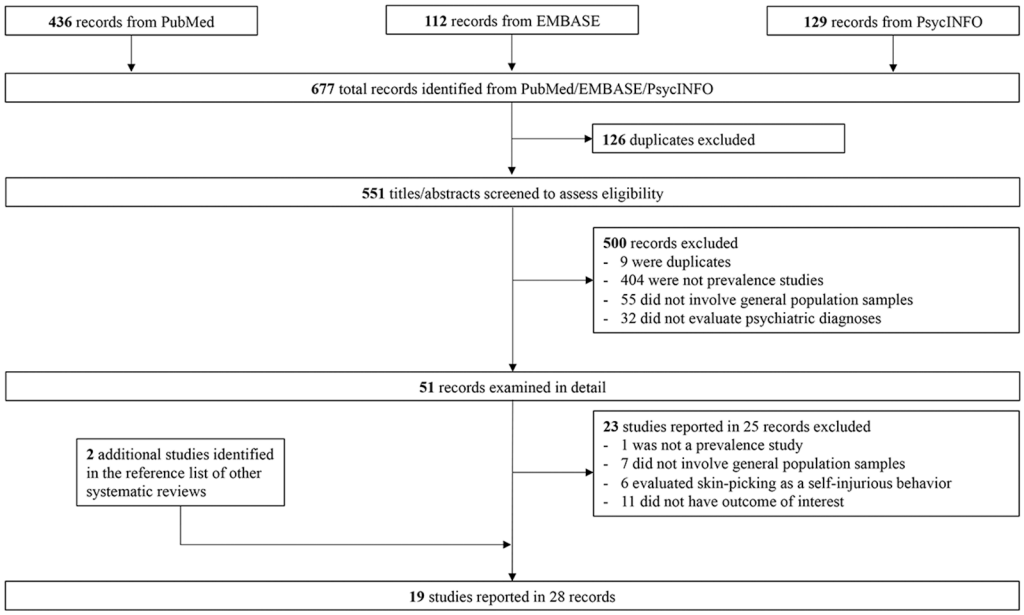


**Figure 1.**
PRISMA flowchart

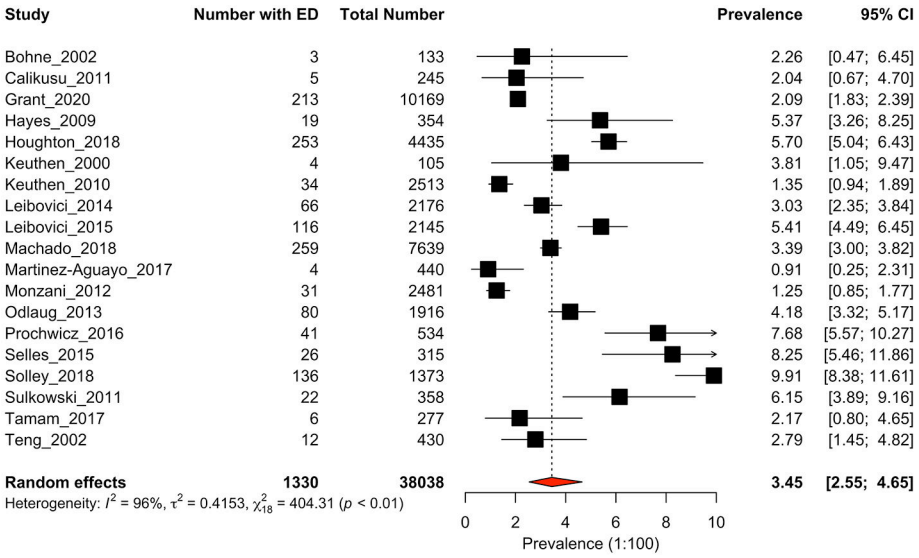


**Figure 2.**
Forest plot for the excoriation disorder prevalence meta-analysis

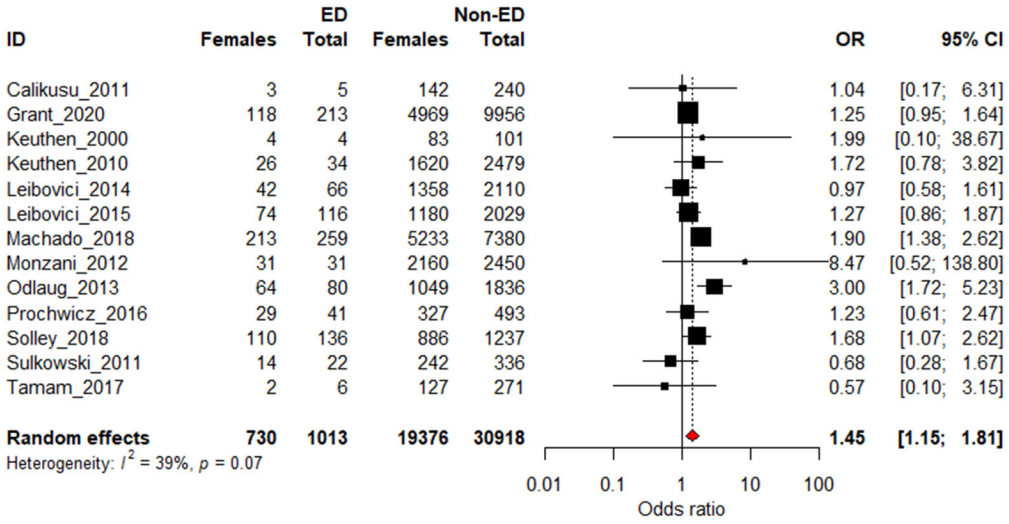


**Figure 3.**
Forest plot for the female-to-male ratio for excoriation disorder

*J Psychiatr Res*. Author manuscript; available in PMC 2024 May 30.

**Table 1.**

Characteristics of included studies

| Study | Area | Sampling setting; procedures; response rate | Number of people; age (years), mean; women, % | ED definition | Assessment and operationalization of ED |
|---|---|---|---|---|---|
| Bohne_2002 | DEU | Psychology students; NR; 66.5% | 133; 22; 74 | Recurrent skin-picking accompanied by tissue damage, which causes distress and/or impairment, and is not provoked by psychiatric/medical condition. | Self-reported answers to the skin-picking inventory |
| Calikusu_2012 | TUR | University students; NR; NR | 245; 22; 59 | Often or very often picks skin resulting in tissue damage, which causes significant distress and/or impairment and is not better accounted for a dermatological problem. | Self-reported answers to the skin-picking inventory |
| Grant_2020 | USA | Online survey; NA; NA | 10,169; 43; 50 | Self-reported diagnosis of ED | "Please indicate whether you currently have or have ever had any of the following medical conditions?" |
| Hayes_2009 | USA | Various public settings; Investigators approached randomly participants; NR | 354; 32; 57 | Severe skin-picking associated with psychosocial impact (based on cutoff scores of 7 on both rating scales) | Self-reported answers to the skin-picking scale and skin-picking impact scale |
| Houghton_2018 | USA | Undergraduate students; A link was posted in a website that students accessed to find opportunities for credits; NR | 4,435; 19; 69 | Skin-picking that occurred at least 5 times per day, caused some physical damage, caused significant distress and/or function impairment | Self-reported answers to the Habit Questionnaire |
| Keuthen_2000 | USA | Psychology College Students; NR; NR | 105; 21; 83 | Repetitive skin-picking resulting in noticeable skin damage and distress or impairment. | Self-reported answers to the skin-picking inventory |
| Keuthen_2010 | USA | Households; random-digit-dial telephone calls within the continental US stratified by state; 56.3% | 2,511; 49; 66 | Skin-picking resulting in noticeable skin damage, not attributable to a medical condition or hearing voices, causes distress and/or impairment | Self-reported answers to the Stanford skin-picking scale |
| Leibovici_2014 | ISR | University students; NR; NR | 2,176; 25; 64 | Skin-picking resulting in noticeable skin damage which is not attributable to a medical condition and causes distress or impairment | Self-reported answers to the Stanford skin-picking scale |
| Leibovici_2015 | ISR | Adults presenting to family physicians or taking children to Dermatology unit; NR; NR | 2,145; 33; 59 | Skin-picking resulting in noticeable skin damage, attempts to decrease/stop picking, causes distress or impairment, not provoked by psychiatric/medical condition. | Self-reported answers to the Stanford skin-picking scale |
| Machado_2018 | BRA | Online survey; NA; NA | 7,639; 27; 71 | Skin-picking associated with increasing tension before and pleasure relief after picking which causes distress and/or impairment | Self-reported answers to the Stanford skin-picking scale |
| Martinez-Aguayo_2017 | CHL | Medicine and kinesiology students; NR; NR | 440; 21; 54 | Recurrent skin-picking (almost always/always) resulting in noticeable skin damage, attempts to decrease/stop skin-picking, causes distress or impairment | Self-reported answers to DSM-5 based questionnaire. |
| Monzani_2012 | GBR | Adults; Individuals from the TwinsUK adult registry; 60% | 2,481; 54; 91 | Severe skin-picking (based on cutoff of 7 on rating scale) | Self-reported answers to the skin-picking scale |

| Study | Area | Sampling setting; procedures; response rate | Number of people; age (years), mean; women, % | ED definition | Assessment and operationalization of ED |
|---|---|---|---|---|---|
| Odlaug_2013 | USA | University students; Random email generation to 6,000 undergraduate, graduate and professional students; 35.1% | 1,916; 23; 58 | Skin-picking associated with skin lesions, repeated attempts to decrease/stop skin-picking, causes distress and/or impairment, not provoked by psychiatric/medical condition. | Self-reported answers to questions |
| Prochwicz_2016 | POL | University students; NR; NR | 534; 21; 67 | Skin-picking associated with skin lesions, attempts to decrease/stop skin-picking, causes distress/impairment, not provoked by psychiatric/medical condition. | Self-reported answers to questions concerning the diagnostic criteria of ED |
| Selles_2015 | SLV | Parents of children visiting the Tin Marin Children`s Museum; Parents were approached by a trained Spanish-speaking research assistant as they entered the museum; NR | 315; 8; 52 | Skin-picking with moderate or high levels of distress and/or interference. | Parent-reported answers to the Repetitive Body Focused Behavior Scale – Parent |
| Solley_2018 | AUS | Psychology students; Recruitment through online course in Psychology and first0year psychology students research participation scheme; NR | 1,378; 33; 73 | Severe skin-picking (based on cutoff of 9 on rating scale) | Self-reported answers to the skin-picking scale |
| Sulkowski_2011 | USA | Undergraduates enrolled in psychology courses; NR; NR | 358; 19; 72 | Significant skin-picking (based on cutoff of 7 on rating scale) and associated distress or impairment | Self-reported answers to the skin-picking scale |
| Taman_2017 | TUR | Fourth- and fifth-year medical students; NR; 92.6% | 277; 23; 53 | Skin-picking associated with increasing tension before and pleasure relief after picking which causes distress and/or impairment | Semi-structured interview with the Minnesota Impulse Disorders Interview |
| Teng_2002 | USA | Undergraduate psychology students at an urban midwestern university; NR; NR | 430; 21; 80 | Recurrent skin-picking (≥ 5 times per day for ≥ 4 weeks) with associated interference in functioning, injury, need for medical attention, or recommendation from a medical professional to stop the behavior. | Self-reported answers to the Habit Questionnaire |

Abbreviations: ED = Excoriation disorder; NA = Not applicable; NR = Not reported